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(54) **Apparatus for measuring ultrasonic characteristics of a medium.**

(57) An embodiment of the present invention relates to an apparatus for obtaining an acoustic characteristic of a medium, more specifically attenuation slope  $\beta$ , by sending ultrasound into the medium and analysing echo signals from the medium. A spectrum obtained from an echo signal includes random partial distortion, namely suffers superposition of the so-called scallop factor. Therefore a value  $\beta$  obtained from such spectrum suffers great fluctuation. In order to suppress such fluctuation, values of  $\beta$  are obtained for a plurality of adjacent points or domains which are estimated to have the same value of  $\beta$  and then a mean of the obtained values of  $\beta$  is obtained. However, such spatial averaging naturally reduces space resolution. An embodiment of the present invention provides for execution of a nonlinear filtering process, for example a median filtering process, in relation to a spectrum (obtained from an echo signal), applies a model spectrum to the result of the nonlinear filtering process and thereby facilitates measurement with suppression of fluctuation even when the number of spatially averaged samples is reduced, by obtaining a value of  $\beta$  from the model spectrum.

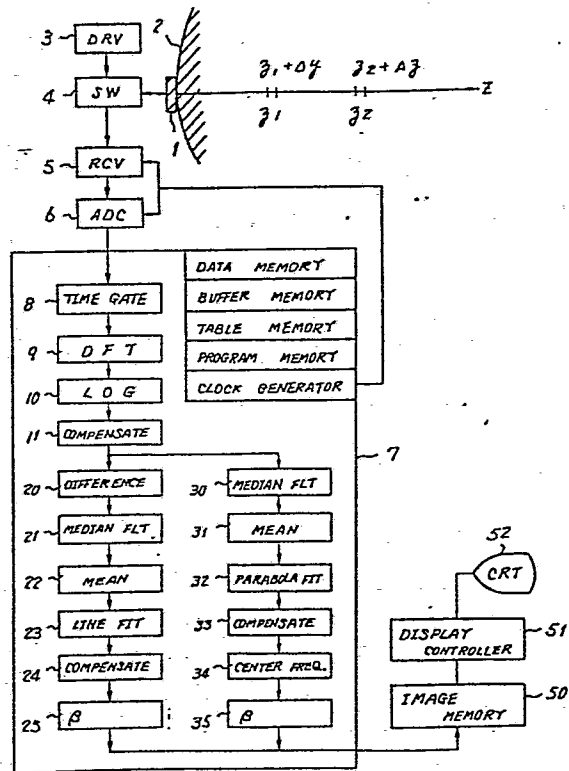


Fig. 1



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# EUROPEAN SEARCH REPORT

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EP 86 10 8705

| DOCUMENTS CONSIDERED TO BE RELEVANT  |  |  |  |
|--|--|--|--|
| Category   | Citation of document with indication, where appropriate, of relevant passages  | Relevant to claim                              | CLASSIFICATION OF THE APPLICATION (Int. Cl. 4) |
| X  | IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING, vol. BME-32, no. 3, March 1985, pages 205-212, IEEE, New York, US; J. OPHIR et al.: "A narrowband pulse-echo technique for In Vivo ultrasonic attenuation estimation"<br>* Whole document * | 1-4  | G 01 N 29/00                                   |
| X  | ULTRASONIC IMAGING, vol. 5, no. 2, April 1983, pages 117-135, Academic Press; M. FINK et al.: "Ultrasonic signal processing for In Vivo attenuation measurement: Short time fourier analysis"<br>* Pages 117,124-125 *                   | 1-4  |  |
| X  | EP-A-0 166 182 (FUJITSU)<br>* Claim 1 * & WO-A-85 2682 (20-06-1985)  | 1-3  |  |
| A  | EP-A-0 064 399 (FUJITSU)<br>* Abstract; figure 3 *   | 1,2  |  |
|  |  |  | TECHNICAL FIELDS SEARCHED (Int. Cl.4)          |
|  |  |  | G 01 N<br>G 01 S                               |
| The present search report has been drawn up for all claims   |  |  |  |
| Place of search<br>THE HAGUE   |  | Date of completion of the search<br>06-07-1989 | Examiner<br>KOUZELIS D.                        |
| <b>CATEGORY OF CITED DOCUMENTS</b><br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |  |  |  |